

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) An adhesive composition comprising at least one tackifier resin and at least one acrylic polymer wherein said tackifier resin comprises monomer repeating units from at least one aromatic monomer and at least one acrylate monomer; [[and]] wherein said tackifier resin has a low residual monomer concentration, and wherein said residual monomer concentration of said tackifier resin is less than about 600 ppm by weight based on the weight of said tackifier resin.
2. (Original) An adhesive composition according to Claim 1 wherein said aromatic monomer is at least one selected from the group consisting of olefinic substituted aromatics.
3. (Original) An adhesive composition according to Claim 2 wherein said aromatic monomer is selected from the group consisting of styrene, alpha-methyl styrene, vinyl toluene, indene, methyldienes, divinylbenzene, dicyclopentadiene, and methyl-dicyclopentadiene.
4. (Original) An adhesive composition according to Claim 1 wherein said acrylate monomer has the general formula:



wherein R_1 is selected from the group consisting of hydrogen, aliphatic groups, and aromatic groups; wherein R_2 is selected from the group consisting of hydrogen, aliphatic

groups, and aromatic groups; and wherein R_3 is selected from the group consisting of hydrogen, aliphatic groups, aromatic groups.

5. (Original) An adhesive composition according to Claim 4 wherein said aliphatic group has 1 to about 20 carbon atoms.

6. (Original) An adhesive composition according to Claim 5 wherein said aliphatic group has 1 to 12 carbon atoms.

7. (Original) An adhesive composition according to Claim 4 wherein said aromatic group has about 6 to about 20 carbon atoms.

8. (Original) An adhesive composition according to Claim 4 wherein both R_1 and R_2 of said acrylate monomer are hydrogen.

9. (Currently Amended) An adhesive composition according to Claim 1 wherein said acrylate monomer is selected from the group consisting of methyl acrylate, acrylic acid, methacrylic acid, methyl methacrylate, ethyl acrylate, ethyl methacrylate, butyl acrylate, butyl methacrylate, isobutyl acrylate, isobutyl methacrylate, n-hexyl acrylate, n-hexyl methacrylate, ethylhexyl acrylate, ethylhexyl methacrylate, n-heptyl acrylate, n-heptyl methacrylate, 2-methylheptyl (meth)acrylate, octyl acrylate, octyl methacrylate, isooctyl (meth)acrylate, n-nonyl(meth)acrylate, iso-nonyl(meth)acrylate, decyl(meth)acrylate, isodecyl acrylate, isodecyl methacrylate, dodecyl(meth)acrylate, isobornyl(meth)acrylate, lauryl methacrylate, lauryl acrylate, tridecyl acrylate, tridecyl methacrylate, stearyl acrylate, stearyl methacrylate, glycidyl methacrylate, alkyl crotonates, vinyl acetate, di-n-butyl maleate, di-octylmaleate, acetoacetoxyethyl methacrylate, acetoacetoxyethyl acrylate, acetoacetoxypropyl methacrylate, acetoacetoxypropyl acrylate, diacetone acrylamide, acrylamide, methacrylamide, hydroxyethyl methacrylate, hydroxyethyl acrylate, allyl methacrylate, tetrahydrofurfuryl

methacrylate, tetrahydrofurfuryl acrylate, cyclohexyl methacrylate, cyclohexyl acrylate, n-hexyl acrylate, n-hexyl methacrylate, 2-ethoxyethyl acrylate, 2-ethoxyethyl methacrylate, isodecyl methacrylate, isodecyl acrylate, 2-methoxy acrylate, 2-methoxy methacrylate, 2-(2-ethoxyethoxy) ethylacrylate, 2-phenoxyethyl acrylate, 2-phenoxyethyl methacrylate, isobornyl acrylate, isobornyl methacrylate, caprolactone acrylate, caprolactone methacrylate, polypropyleneglycol monoacrylate, polypropyleneglycol monomethacrylate, polyethyleneglycol(400) acrylate, polypropyleneglycol(400) methacrylate, benzyl acrylate, benzyl methacrylate, ~~sodium 1-allyloxy-2-hydroxypropyl sulfonate, acrylonitrile,~~ and mixtures thereof.

10. (Original) An adhesive composition according to Claim 1 wherein said acrylate monomer has up to about 20 carbon atoms.

11. (Original) An adhesive composition according to Claim 10 wherein said acrylate monomer is selected from the group consisting of acrylic acid, 2-ethylhexyl acrylate, methyl methacrylate, methyl acrylate, acrylic acid, methacrylic acid, methyl methacrylate, ethyl acrylate, ethyl methacrylate, butyl acrylate, butyl methacrylate, isobutyl acrylate, isobutyl methacrylate, n-hexyl acrylate, n-hexyl methacrylate, ethylhexyl acrylate, ethylhexyl methacrylate, n-heptyl acrylate, n-heptyl methacrylate, 2-methylheptyl (meth)acrylate, octyl acrylate, octyl methacrylate, isooctyl (meth)acrylate, n-nonyl(meth)acrylate, iso-nonyl(meth)acrylate, decyl(meth)acrylate, isodecyl acrylate, isodecyl methacrylate, dodecyl(meth)acrylate, isobornyl(meth)acrylate, hydroxyethyl methacrylate, hydroxyethyl acrylate, allyl methacrylate, cyclohexyl methacrylate, cyclohexyl acrylate, n-hexyl acrylate, n-hexyl methacrylate, isobornyl acrylate, isobornyl methacrylate, and mixtures thereof.

12. (Currently Amended) An adhesive composition according to Claim 11 comprising at least one tackifier resin and at least one acrylic polymer wherein said tackifier resin comprises monomer repeating units from at least one aromatic monomer and at least one acrylate monomer; wherein said tackifier resin has a low residual

monomer concentration, wherein said acrylate monomer has up to about 20 carbon atoms, wherein said acrylate monomer is selected from the group consisting of acrylic acid, 2-ethylhexyl acrylate, methyl methacrylate, methyl acrylate, acrylic acid, methacrylic acid, methyl methacrylate, ethyl acrylate, ethyl methacrylate, butyl acrylate, butyl methacrylate, isobutyl acrylate, isobutyl methacrylate, n-hexyl acrylate, n-hexyl methacrylate, ethylhexyl acrylate, ethylhexyl methacrylate, n-heptyl acrylate, n-heptyl methacrylate, 2-methylheptyl (meth)acrylate, octyl acrylate, octyl methacrylate, isooctyl (meth)acrylate, n-nonyl(meth)acrylate, iso-nonyl(meth)acrylate, decyl(meth)acrylate, isodecyl acrylate, isodecyl methacrylate, dodecyl(meth)acrylate, isobornyl(meth)acrylate, hydroxyethyl methacrylate, hydroxyethyl acrylate, allyl methacrylate, cyclohexyl methacrylate, cyclohexyl acrylate, n-hexyl acrylate, n-hexyl methacrylate, isobornyl acrylate, isobornyl methacrylate, and mixtures thereof, and wherein said acrylate monomers are acrylic acid and 2-ethylhexyl acrylate.

13. (Original) An adhesive composition according to Claim 1 wherein said acrylate monomer contains at least one functional group selected from the group consisting of hydroxy, cycloaliphatic, acid, epoxide, amide, acrylonitril and acrylate groups.

14. (Original) An adhesive composition according to Claim 1 wherein said tackifier resin is produced by a radical catalyzed polymerization process utilizing at least one initiator.

15. (Original) An adhesive composition according to claim 14 wherein said initiator is selected from the group consisting of diacyl peroxides, dialkylperoxidicarbonates, tert-alkyl peroxyesters, di-tert-alkyl peroxides, tert-alkyl hydroperoxides, ketone peroxides, and mixtures thereof.

16. (Original) An adhesive composition according to Claim 1 wherein said tackifier resin is produced by a process comprising contacting a tackifier resin product stream

with at least one carrier at a temperature sufficient to remove a portion of at least one residual monomer to produce said tackifier resin.

17. (Original) An adhesive composition according to Claim 1 wherein said tackifier resin does not significantly decrease the moisture vapor transport rate of said adhesive composition containing said tackifier resin.

18. (Original) An adhesive composition according to Claim 17 wherein said tackifier resin does not decrease said moisture vapor transport rate of said adhesive composition by more than 25% over said adhesive composition without said tackifier resin.

19. (Original) An adhesive composition according to Claim 17 wherein said moisture vapor transport rate of said adhesive composition is the same or increased over said adhesive composition without said tackifier resin.

20. (Original) An adhesive composition according to Claim 17 wherein said moisture vapor transport rate of said adhesive composition ranges from about 200 to about 3000.

21. (Original) An adhesive composition according to Claim 20 wherein said moisture vapor transport rate of said adhesive composition ranges from about 500 to 1500.

22. (Canceled)

23. (Currently Amended) An adhesive composition according to Claim ~~[[22]]~~1 wherein said residual monomer concentration of said tackifier resin is less than about 300 ppm by weight based on the weight of said tackifier resin.

24. (Original) An adhesive composition according to Claim 23 wherein said residual monomer concentration of said tackifier resin is less than about 200 ppm aromatic

monomer based on the weight of said tackifier resin and less than about 400 ppm acrylic monomer.

25. (Original) An adhesive composition according to Claim 24 wherein said residual monomer concentration of said tackifier resin is less than about 100 ppm by weight aromatic monomer and less than about 150 ppm by weight acrylic monomer.

26. (Original) An adhesive composition according to Claim 1 wherein said tackifier resin has a residual solvent concentration less than about 500 ppm by weight based on the weight of said tackifier resin.

27. (Original) An adhesive composition according to Claim 1 wherein the amount of aromatic monomer repeating units in said tackifier resin ranges from about 20% to about 70% based on the total amount of monomer repeating units in said tackifier resin.

28. (Original) An adhesive composition according to Claim 1 wherein the amount of acrylate monomer repeating units in said tackifier resin ranges from about 30% to about 80% based on the total amount of monomer repeating units in said tackifier resin.

29. (Original) An adhesive composition according to Claim 1 wherein said tackifier resin has a R&B softening point ranging from being a liquid at room temperature to about 180°C.

30. (Original) An adhesive composition according to Claim 1 wherein the acid number of said tackifier resin ranges from about 0 to about 300 mg KOH/g resin.

31. (Original) An adhesive composition according to Claim 1 wherein the hydroxyl number of said tackifier resin ranges from about 0 to about 300.

32. (Original) An adhesive composition according to Claim 1 wherein the MMAP cloud point of said tackifier resin is less than 50°C.
33. (Original) An adhesive composition according to Claim 1 wherein the number average molecular weight (Mn) of said tackifier resin ranges from about 1,500 to about 7,000 daltons.
34. (Original) An adhesive composition according to Claim 33 wherein said number average molecular weight (Mn) of said tackifier resin ranges from 2,000 to 4,000 daltons.
35. (Original) An adhesive composition according to Claim 1 wherein the weight average molecular weight (Mw) of said tackifier resin ranges from about 2,000 to about 25,000 daltons.
36. (Original) An adhesive composition according to Claim 35 wherein said weight average molecular weight (Mw) of said tackifier resin ranges from 3,000 to 10,000.
37. (Original) An adhesive composition according to Claim 1 wherein the z-average molecular weight (Mz) of said tackifier resin ranges from about 3,000 to about 75,000 daltons.
38. (Original) An adhesive composition according to Claim 37 wherein said z-average molecular weight (Mz) of said tackifier resin ranges from 5,000 to 20,000.

39. (Original) An adhesive composition according to Claim 1 wherein the Gardner color of said tackifier resin is less than 5.

40. (Currently Amended) An adhesive composition ~~according to Claim 1~~ comprising at least one tackifier resin and at least one acrylic polymer wherein said tackifier resin comprises monomer repeating units from at least one aromatic monomer and at least one acrylate monomer; wherein said tackifier resin has a low residual monomer concentration, and wherein said tackifier resin comprises monomer repeating units from styrene, acrylic acid, and 2-ethylhexyl acrylate.

41. (Original) An adhesive composition according to Claim 40 wherein the amount of styrene repeating units ranges from 0.1% to 99.9% based on the total amount of monomer repeating units in said tackifier resin.

42. (Original) An adhesive composition according to Claim 40 wherein the amount of acrylic acid and 2-ethylhexyl acrylate ranges from 0.1% to 99.9% based on the total amount of monomer repeating units in said tackifier resin.

43. (Original) An adhesive composition according to claim 41 wherein the amount of styrene repeating units ranges from about 20% to about 70% based on the total amount of monomer repeating units in said tackifier resin, and the combined amount of acrylic acid repeating units and 2-ethylhexyl acrylate repeating units ranges from about 30% to about 80%.

44. (Original) An adhesive composition according to Claim 1 wherein said tackifier resin does not significantly decrease the moisture vapor transport rate of said adhesive composition comprising said tackifier resin.

45. (Original) An adhesive composition according to Claim 1 wherein said tackifier resin does not significantly increase fogging of an adhesive composition comprising said tackifier resin.

46. (Original) An adhesive composition according to Claim 1 wherein said tackifier resin does not significantly exhibit skin sensitivity properties.

47. (Original) An adhesive composition according to Claim 1 wherein said tackifier resin does not significantly decrease the moisture vapor transport rate of said adhesive composition comprising said tackifier resin; and wherein said tackifier resin does not significantly increase fogging of said adhesive composition.

48. (Original) An adhesive composition according to Claim 47 wherein said tackifier resin does not significantly exhibit skin sensitivity properties.

49. (Original) An adhesive composition according to Claim 1 wherein said acrylic polymer are selected from homopolymers, copolymers, and terpolymers.

50. (Currently Amended) An adhesive composition according to Claim 49 wherein said acrylic polymer comprises at least one acrylate repeating unit selected from the group consisting of methyl acrylate, acrylic acid, methacrylic acid, methyl methacrylate, ethyl acrylate, ethyl methacrylate, butyl acrylate, butyl methacrylate, isobutyl acrylate, isobutyl methacrylate, n-hexyl acrylate, n-hexyl methacrylate, ethylhexyl acrylate, ethylhexyl methacrylate, n-heptyl acrylate, n-heptyl methacrylate, 2-methylheptyl (meth)acrylate, octyl acrylate, octyl methacrylate, isooctyl (meth)acrylate, n-nonyl(meth)acrylate, iso-nonyl(meth)acrylate, decyl(meth)acrylate, isodecyl acrylate, isodecyl methacrylate, dodecyl(meth)acrylate, isobornyl(meth)acrylate, lauryl methacrylate, lauryl acrylate, tridecyl acrylate, tridecyl methacrylate, stearyl acrylate, stearyl methacrylate, glycidyl methacrylate, alkyl crotonates, vinyl acetate, di-n-butyl

maleate, di-octylmaleate, acetoacetoxyethyl methacrylate, acetoacetoxyethyl acrylate, acetoacetoxypropyl methacrylate, acetoacetoxypropyl acrylate, diacetone acrylamide, acrylamide, methacrylamide, hydroxyethyl methacrylate, hydroxyethyl acrylate, allyl methacrylate, tetrahydrofurfuryl methacrylate, tetrahydrofurfuryl acrylate, cyclohexyl methacrylate, cyclohexyl acrylate, n-hexyl acrylate, n-hexyl methacrylate, 2-ethoxyethyl acrylate, 2-ethoxyethyl methacrylate, isodecyl methacrylate, isodecyl acrylate, 2-methoxy acrylate, 2-methoxy methacrylate, 2-(2-ethoxyethoxy) ethylacrylate, 2-phenoxyethyl acrylate, 2-phenoxyethyl methacrylate, isobornyl acrylate, isobornyl methacrylate, caprolactone acrylate, caprolactone methacrylate, polypropyleneglycol monoacrylate, polypropyleneglycol monomethacrylate, polyethyleneglycol(400) acrylate, polypropyleneglycol(400) methacrylate, benzyl acrylate, benzyl methacrylate, ~~sodium 1-allyloxy 2-hydroxypropyl sulfonate, acrylonitrile,~~ and mixtures thereof.

51. (Original) An adhesive composition according to Claim 49 wherein said acrylic polymer comprises monomer repeating units from polar copolymerizable monomers.

52. (Original) An adhesive composition according to Claim 51 wherein said polar copolymerizable monomers are selected from the group consisting of cyanoalkyl acrylates, acrylamides, or substituted acrylamides, N-vinyl pyrrolidone, N-vinyl caprolactam, acrylonitrile, vinyl chloride, vinylidene chloride, diallyl phthalate, and mixtures thereof.

53. (Original) An adhesive composition according to Claim 1 wherein said acrylic polymer is at least one selected from the group consisting of acrylic copolymers, acrylated polyethers, acrylated polyester-based polyurethanes, methacrylated polyesters, and acrylated epoxies.

54. (Original) An adhesive composition according to Claim 1 wherein said acrylic polymer is produced during the polymerization process of the tackifier resin by the addition of at least one acrylic monomer or at least one acrylic oligomer to a reactor zone in the presence of an initiator to produce said tackifier resin and said acrylic monomer.

55. (Currently Amended) An adhesive composition according to Claim 54 wherein said acrylic monomer is at least one selected from the group consisting of methyl acrylate, acrylic acid, methacrylic acid, methyl methacrylate, ethyl acrylate, ethyl methacrylate, butyl acrylate, butyl methacrylate, isobutyl acrylate, isobutyl methacrylate, n-hexyl acrylate, n-hexyl methacrylate, ethylhexyl acrylate, ethylhexyl methacrylate, n-heptyl acrylate, n-heptyl methacrylate, 2-methylheptyl (meth)acrylate, octyl acrylate, octyl methacrylate, isooctyl (meth)acrylate, n-nonyl(meth)acrylate, isononyl(meth)acrylate, decyl(meth)acrylate, isodecyl acrylate, isodecyl methacrylate, dodecyl(meth)acrylate, isobornyl(meth)acrylate, lauryl methacrylate, lauryl acrylate, tridecyl acrylate, tridecyl methacrylate, stearyl acrylate, stearyl methacrylate, glycidyl methacrylate, alkyl crotonates, vinyl acetate, di-n-butyl maleate, di-octylmaleate, acetoacetoxyethyl methacrylate, acetoacetoxyethyl acrylate, acetoacetoxypropyl methacrylate, acetoacetoxypropyl acrylate, diacetone acrylamide, acrylamide, methacrylamide, hydroxyethyl methacrylate, hydroxyethyl acrylate, allyl methacrylate, tetrahydrofurfuryl methacrylate, tetrahydrofurfuryl acrylate, cyclohexyl methacrylate, cyclohexyl acrylate, n-hexyl acrylate, n-hexyl methacrylate, 2-ethoxyethyl acrylate, 2-ethoxyethyl methacrylate, isodecyl methacrylate, isodecyl acrylate, 2-methoxy acrylate, 2-methoxy methacrylate, 2-(2-ethoxyethoxy) ethylacrylate, 2-phenoxyethyl acrylate, 2-phenoxyethyl methacrylate, isobornyl acrylate, isobornyl methacrylate, caprolactone acrylate, caprolactone methacrylate, polypropyleneglycol monoacrylate, polypropyleneglycol monomethacrylate, polyethyleneglycol(400) acrylate, polypropyleneglycol(400) methacrylate, benzyl acrylate, benzyl methacrylate, ~~sodium 4-allyloxy-2-hydroxypropyl sulfonate, acrylonitrile,~~ and mixtures thereof.

56. (Currently Amended) An adhesive composition according to Claim 54 wherein said acrylic oligomers comprise repeating units from at least one acrylic monomer selected from the group consisting of methyl acrylate, acrylic acid, methacrylic acid, methyl methacrylate, ethyl acrylate, ethyl methacrylate, butyl acrylate, butyl methacrylate, isobutyl acrylate, isobutyl methacrylate, n-hexyl acrylate, n-hexyl methacrylate, ethylhexyl acrylate, ethylhexyl methacrylate, n-heptyl acrylate, n-heptyl methacrylate, 2-methylheptyl (meth)acrylate, octyl acrylate, octyl methacrylate, isooctyl (meth)acrylate, n-nonyl(meth)acrylate, iso-nonyl(meth)acrylate, decyl(meth)acrylate, isodecyl acrylate, isodecyl methacrylate, dodecyl(meth)acrylate, isobornyl(meth)acrylate, lauryl methacrylate, lauryl acrylate, tridecyl acrylate, tridecyl methacrylate, stearyl acrylate, stearyl methacrylate, glycidyl methacrylate, alkyl crotonates, vinyl acetate, di-n-butyl maleate, di-octylmaleate, acetoacetoxyethyl methacrylate, acetoacetoxyethyl acrylate, acetoacetoxypropyl methacrylate, acetoacetoxypropyl acrylate, diacetone acrylamide, acrylamide, methacrylamide, hydroxyethyl methacrylate, hydroxyethyl acrylate, allyl methacrylate, tetrahydrofurfuryl methacrylate, tetrahydrofurfuryl acrylate, cyclohexyl methacrylate, cyclohexyl acrylate, n-hexyl acrylate, n-hexyl methacrylate, 2-ethoxyethyl acrylate, 2-ethoxyethyl methacrylate, isodecyl methacrylate, isodecyl acrylate, 2-methoxy acrylate, 2-methoxy methacrylate, 2-(2-ethoxyethoxy) ethylacrylate, 2-phenoxyethyl acrylate, 2-phenoxyethyl methacrylate, isobornyl acrylate, isobornyl methacrylate, caprolactone acrylate, caprolactone methacrylate, polypropyleneglycol monoacrylate, polypropyleneglycol monomethacrylate, polyethyleneglycol(400) acrylate, polypropyleneglycol(400) methacrylate, benzyl acrylate, benzyl methacrylate, ~~sodium 4-allyloxy-2-hydroxypropyl sulfonate, acrylonitrile,~~ and mixtures thereof.

57. (Original) An adhesive composition according to Claim 1 wherein the amount of said tackifier resin ranges from about 0.1% by weight to about 50% by weight based on the weight of the adhesive composition.

58. (Original) An adhesive composition according to Claim 1 wherein the amount of said tackifier resin ranges from 0.1% by weight to 25% by weight based on the weight of the adhesive composition.

59. (Currently Amended) A process of making an adhesive composition, said process comprising providing at least one tackifier resin and at least one acrylic polymer; wherein said tackifier resin comprises monomer repeating units from at least one aromatic monomer and at least one acrylate monomer; ~~[[and]]~~ wherein said tackifier resin has a low residual monomer concentration; and wherein said residual monomer concentration of said tackifier resin is less than about 600 ppm by weight based on the weight of said tackifier resin.

60. (Original) A process according to Claim 59 further comprising contacting said adhesive composition with at least one substrate to produce an article.

61. (Original) A process according to Claim 60 wherein said substrate is selected from the group consisting of polyethylene terephthalate, biaxially oriented polypropylene, woven fabrics, non-woven fabrics, metals, metal foils, paper, glass, ceramics, and composite materials comprising laminates of one or more of these materials.

62. (Original) An adhesive composition produced by the process of Claim 59.

63. (Currently Amended) An adhesive composition consisting essentially of at least one tackifier resin and at least one acrylic polymer; wherein said tackifier resin consists essentially of monomer repeating units from at least one aromatic monomer and at least one acrylic monomer; ~~[[and]]~~ wherein said tackifier resin has a low residual monomer

concentration, and wherein said residual monomer concentration of said tackifier resin is less than about 600 ppm by weight based on the weight of said tackifier resin.

64. (Original) An adhesive composition according to Claim 63 wherein said aromatic monomer is styrene.

65. (Currently Amended) An adhesive composition ~~according to Claim 64~~ consisting essentially of at least one tackifier resin and at least one acrylic polymer; wherein said tackifier resin consists essentially of monomer repeating units from at least one aromatic monomer and at least one acrylic monomer, wherein said tackifier resin has a low residual monomer concentration, wherein said aromatic monomer is styrene, and wherein said acrylic monomers are 2-ethyl hexyl acrylate and acrylic acid.

66. (Original) An article comprising said adhesive composition of Claim 1.

67. (New) An adhesive composition comprising at least one tackifier resin and at least one acrylic polymer wherein said tackifier resin comprises monomer repeating units from at least one aromatic monomer and at least one other monomer selected from the group consisting of sodium 1-allyloxy-2-hydroxypropyl sulfonate and acrylonitrile; wherein said tackifier resin has a residual monomer concentration less than about 600 ppm by weight based on the weight of said tackifier resin.